

STN P	Pevné inštalácie pre dráhové aplikácie Požiadavky na validáciu simulačných programov používaných na návrh napájacích systémov pre elektrickú trakciu Časť 2: Jednosmerný prúd (DC) – mestské železničné systémy	STN P CLC/TS 50641-2 34 1572
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Fixed Installations for Railway Applications - Requirements for the validation of simulation tools used for the design of electric traction power supply systems - Part 2: specific DC urban case

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

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English Version

**Fixed Installations for Railway Applications - Requirements for
the validation of simulation tools used for the design of electric
traction power supply systems - Part 2: specific DC urban case**

Installations Fixes pour Applications ferroviaires -
Exigences relatives à la validation des outils de simulation
utilisés pour la conception des systèmes d'alimentation de
la traction - Partie 2 : Cas spécifique des réseaux urbains
en courant continu

Ortsfeste Anlagen für Bahnanwendungen - Anforderungen
für die Validierung von Simulationsprogrammen für die
Auslegung von Bahnenergieversorgungssystemen - Teil 2:
Spezifisches Gleichstrom-Stadtbahnssystemen

This Technical Specification was approved by CENELEC on 2024-03-25.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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CLC/TS 50641-2:2024 (E)

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European foreword

This document (CLC/TS 50641-2:2024) has been prepared by CLC/SC 9XC “Electric supply and earthing systems for public transport equipment and ancillary apparatus (Fixed installations)”, of Technical Committee CLC/TC 9X “Electrical and electronic applications for railways”.

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CLC/TS 50641-2:2024 (E)**Introduction**

This document has been prepared following the publication of EN 50641, which will be renamed as EN 50641-1 in the future.

This document is Part 2 of the EN 50641 series and dedicated to urban rail transport with DC 750 V power supply, as well as other electric DC traction power supply systems. It has the same structure as EN 50641 but with input representative of urban rail transports with dense traffic and short feeding sections, small headways and frequent stops correlated with regenerative energy flows.

Experts representing approximately ten member states worked to draft this completely new document. The results and data are taken from the most well-known representative simulation softwares in Europe and related experts. This document provides a means of assessing simulation tools and provides assurance to anyone who depends upon their output.

1 Scope

This document specifies requirements for the test and acceptance of simulation tools used for the design of DC electric traction power supply systems for urban rail guided mass transport systems, such as tramways, elevated and underground railways, mountain railways, trolleybus systems, and magnetically levitated systems which use a contact line system. The validation process will be carried out for the 750 V DC voltage, and other voltages can be validated with the cross-acceptance.

This document focuses on the validation of the core simulation functions comprising the equations and functions which calculate:

- the mechanical movement of trains and
- the load flow of the electrical traction power supply system.

NOTE 1 This document provides only the requirements for demonstration of the algorithms and calculations of core functions. The use of a validated simulation tool in accordance with this document does not in itself, demonstrate good practice in electric traction power supply system design, neither does it guarantee that the simulation models and data for infrastructure or trains used in the tool are correct for a given application. The choice and application of any models and data, of individual system components, in a design is therefore subject to additional verification processes and not in the scope of this document. Competent development of design models and full understanding of the limits of design tools remain requirements in any system design. This document does not reduce any element of the need for competent designers to lead the design process.

This document also specifies procedures for the modification of simulation tools, in particular the limits of applicability of acceptance when tools are modified. These procedures focus on determining whether the core functions of the simulation model are modified.

Because the purpose of this standard deals with the verification of the core functionality, the test case described in this document does not represent an existing network.

NOTE 2 Additionally, the application of this document ensures that the output data of different simulation tools are consistent and verifiable when they are using the same set of input data as given in this document.

This document excludes complex models with active components such as controlled rectifiers and inverters.

This document does not mandate the use of a particular simulation tool in order to validate the design of an electric traction power supply system.

This document does not deal with validation of simulation tools by measurement.

The document is not applicable to the validation of simulation tools with respect to:

- short circuit studies;
- electrical safety studies (e.g. rail potential);
- harmonic studies;
- studies of transient phenomena; and
- electromagnetic compatibility studies over a wide frequency spectrum.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 50163:2004, *Railway applications - Supply voltages of traction systems*

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EN 50388-1:2022, *Railway Applications - Fixed installations and rolling stock - Technical criteria for the coordination between electric traction power supply systems and rolling stock to achieve interoperability - Part 1: General*

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